A New Species of Hermit Crab, *Pylopagurus diegensis* (Decapoda: Anomura), with a Key for the Genus in the Eastern Pacific[1]

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DURING A STUDY of the decapod Crustacea of the San Diego region, a new species of pagurid crab of the genus *Pylopagurus* was encountered. The following account is a description of this species, including a comparison with a closely related species of *Pylopagurus* in the eastern Pacific and a comparison with the recently created genus *Benthopagurus* Wass of the western Atlantic.

The key to the eastern Pacific pylopagurids provided by Walton (1954) is modified to include this new species.

DESCRIPTION

Pylopagurus Milne-Edwards and Bouvier 1893

Chelipeds dissimilar and unequal, the right much larger, highly developed as a more or less discoidal operculum. Fourth pair of thoracic legs subchelate. External maxillipeds widely separated at base, exopodite of all three pairs flagellate. Abdomen not spirally coiled, straight or merely flexed; paired abdominal appendages present on first somite of female only; vasa deferentia of male not extruded.

Pylopagurus diegensis n. sp.
Fig. 1

Chelipeds unlike, right larger than left, tips of fingers corneous. Moveable finger of major cheliped with 2 or 3 tubercles in a row, medially, in proximal half; outer edge with a row of outward- and upward-directed tubercles. Palm of major cheliped with 9 to 12 tubercles forming an oblique ridge extending from the articulation of the movable finger with the palm laterally and proximally toward the carpus; outer and inner margins lined with outward- and upward-directed tubercles, those at the outer distal margin tending to become spiniform; a single small tubercle in the apparent depression extending from the fixed finger toward the carpus; 4 minute tubercles in a row on inner side beneath inner dorsal margin; under side of palm smooth, bare. Entire upper margin lined with long, heavy, upward- and outward-directed bristles; upper surface matted with short, thin bristles; these combine to give an exaggerated laterally concave appearance to the palm; heavy bristles

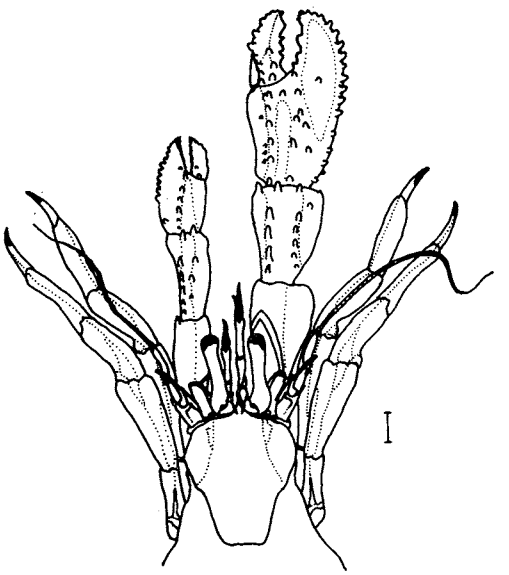

FIG. 1. *Pylopagurus diegensis*. Dorsal aspect of cephalothorax and appendages of male holotype. La Jolla, California. Diagnostic tubercles and spines of major and minor chelipeds indicated. (Scale = 2 mm.)

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line the opposing faces of the fingers which are strongly toothed. Carpus of major cheliped just over half length of palm; 3 prominent spines along distal margin, becoming blunt in larger specimens; the lateral two form the termini for 2 sub-parallel, longitudinal rows of spines, the inner of which contains 5 to 6 spines; lower surface smooth, bare; upper and lateral surfaces heavily bristled. Merus essentially smooth, with a few small tubercles on inner and outer, lower, distal margins.

Minor cheliped thinner, extending less than half the distance along major palm. Movable finger of minor cheliped with 1 or 2 minute tubercles in proximal half; lateral dentition obscure. Palm with median longitudinal row of tubercles, a single outer, proximal marginal tooth, and a row of 9 to 11 outer, distal marginal teeth; a sharp downward slope of palm along inner edge of median row of tubercles gives this row a marginal appearance, and hand appears twisted. Under side of hand smooth, bare. Upper and lateral margins densely covered with long bristles. Teeth absent from fingers; close-set, short, heavy bristles in their place. Carpus subequal in length with palm, crowned by 2 close-set, subparallel rows of spines whose distal members are the largest and extend over the proximal extreme of the palm; the outer row is larger and more numerous; lower surface smooth, bare; upper and lateral surfaces heavily bristled. Merus with 6 to 8 spines on lower, outer, distal margin; otherwise essentially smooth.

First and second walking legs subequal in length. Dactylus the shortest, propodus and carpus subequal, merus the longest segment; dactylus of both with 8 spines in a longitudinal row beneath; propodus with 3 terminal spines and 6 in a longitudinal row beneath; carpus with a terminal spine above; merus smooth.

Eye stalks swollen a base, 4 times as long as wide at widest; cornea slightly swollen, not reaching proximal extreme of antennal flagellum. Antennule reaching to distal margin of merus of major cheliped when extended. Eye scales with a single blunt spine. Rostrum extending one-half the length of the eye scales. Anterior (hard) portion of carapace width subequal with length.

Abdomen flexed; telson essentially symmetrical.

Carapace length (large male): 13.8 mm.

HABITAT: Shallow water, 3 to 20 meters, rocky bottom, inhabiting various shells including *Astraea undosa, Conus californicus, Tegula* sp., and *Aletes squamigerus*. One individual was found in an attached serpulid tube.

COLOR: Carapace, eyes, anterior appendages pale pink. Chelipeds and walking legs darker pink. Tubercles on chelae white. Approximate distal half of fingers white on both chelae. Dactyls of walking legs with dark corneous tips; a ring of white just proximal to these tips. Proximal ends of dactyls with a broad ring of dark red. (Note: The dark red ring has persisted in alcohol.) All mouth parts and antennules with blue.

TYPE LOCALITY: La Jolla Cove, La Jolla, San Diego County, California, 5 meters.

KNOWN RANGE: Santa Catalina Island, California, to Coronados Islands, Baja California, Mexico; one specimen from the Allan Hancock Foundation collection is labeled "Guadeloupe Is." (Mexico).

TYPE SPECIMENS: The holotype male and a paratype female are deposited at the Allan Hancock Foundation (AHF 6212). A paratype male and female are deposited with the U. S. National Museum (USNM 120424 and 120425).

REMARKS: It is our opinion (and Janet Haig of the Allan Hancock Foundation agrees) that, of the eastern Pacific species, *P. diegensis* is nearest *P. hirtimanus* (Fig. 2). The two are readily separated by the rosette-shaped bases of the tubercles on the palms and major movable finger of *P. hirtimanus,* no such radiating basal processes being present in *P. diegensis.* The asymmetrical telson, relatively longer dactyls on the first and second walking legs, and more spiniform carpal armanent of the chelae of *P. hirtimanus* further serve to distinguish these species. *P. hirtimanus* has been described by Faxon (1893).

P. diegensis generally inhabits more tightly coiled shells than do most members of the genus, and it does not seem to use its major chela in the characteristic opercular manner. Its abdomen is also considerably more tightly coiled than others, such as *P. holmesi;* this very likely is linked with the kind of shells utilized.

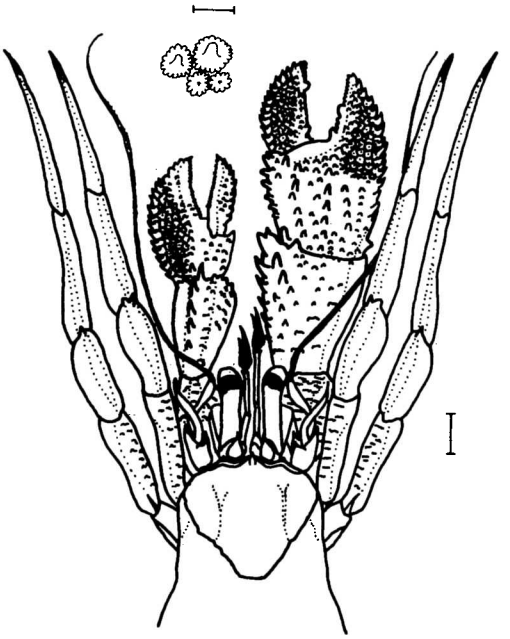

FIG. 2. *Pylopagurus hirtimanus.* Dorsal aspect of cephalothorax and appendages of female. Cocos Island, Costa Rica. Diagnostic tubercles and spines of major and minor chelipeds indicated. (Scale = 2 mm.) Rosette-shaped tubercles enlarged. (Scale = 0.5 mm.)

DISCUSSION

Wass (1963) lists three characters to separate *Benthopagurus* Wass from *Pylopagurus* Milne-Edwards and Bouvier: (a) the large size (largest 13.5 mm); (b) the lack of the use of the major palm as an operculum, and (c) the non-mushroom shape of the armament of the dorsal surface of the major palm.

With the description of this new species of *Pylopagurus,* the first two characters (a and b) can no longer be used to separate the two genera, and only (c), the relatively less spiniform armament of *Pylopagurus diegensis,* serves to distinguish this pylopagurid from the present members of the genus *Benthopagurus.*

Since there is no evidence for a convergent relationship between *Benthopagurus* and *Pylopagurus,* we feel the two are closely related, and that more salient criteria are needed in order to preserve the genus *Benthopagurus.* It is suggested that if such criteria can not be established, then perhaps *Benthopagurus* should be reduced to sub-generic rank under *Pylopagurus.*

KEY TO THE EASTERN PACIFIC SPECIES OF *Pylopagurus* (after Walton, 1954)

I. Carpus of major cheliped with 3 or fewer teeth on inner margin of dorsal surface
   - A. Telson with V-shaped notch in terminal margin, strong curved teeth at each edge of notch; margins of opercular face of hand a low subserrate ridge
     1. Major cheliped discoidal, widest portion at base of dactyl; carpus length less than twice its width ..... *P. holmesi*
     2. Major cheliped spatulate, widest at point distal to base of dactyl; carpus length more than twice its width ..... *P. longicarpus*
   - B. Telson a simple semioval plate with entire margins; margins of opercular face of large hand with distinct denticulations
     1. Carpus of major cheliped with 2 teeth on inner margin of dorsal surface
        - a. Lateral points of front rounded, inner margin of minor hand unarmed ..... *P. quatemoci*
        - b. Lateral points of front acute, inner margin of minor hand with row of sharp spines ..... *P. coronatus*

2. Carpus of major cheliped with 3 teeth on inner margin of dorsal surface
   a. Outer margin of major hand a low granulate ridge . . *P. spinicarpus*
   b. Outer margin of major hand with large, evenly spaced teeth tipped with inwardly directed corneous spinules . . . . . *P. hancocki*

II. Carpus of major cheliped with more than 3 teeth on inner margin of dorsal surface
   A. Palm of hands ornamented with large conical tubercles
      1. Tubercles of palms and movable fingers with radiating basal processes; telson grossly asymmetrical (Fig. 2) . . . . . *P. hirtimanus*
      2. Tubercles without bases; telson essentially symmetrical (Fig. 1) . . . . . *P. diegensis*
   B. Palm set with microscopic granules; telson essentially symmetrical
      1. Denticulations of telson restricted to sides of notch in terminal margin . . . . . *P. cervicornis*
      2. Denticulations of telson not restricted to notch, but extending across terminal margin of entire telson
         a. Major cheliped longer than rest of body, granules of palm tipped with vertical corneous spinules . . . . . *P. longimanus*
         b. Major cheliped shorter than rest of body, granules of palm tipped by anteriorly directed corneous spinules . . . . . *P. varians*

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LITERATURE CITED

FAXON, W. 1893. Reports on the dredging operation . . . by the U. S. Fish Commission Steamer *Albatross* during 1891 . . . VI. Preliminary description of new species of Crustacea. Bulletin of the Museum of Comparative Zoology at Harvard College, vol. 24, pp. 149–220.

MILNE-EDWARDS, H., and E. L. BOUVIER. 1893. Reports of the results of dredging . . . by the U. S. Coast Survey Steamer *Blake* . . . XXXIII. Descriptions des Crustacea de la famille des Paguriens recueillis pendant l'Expedition. Memoirs of the Museum of Comparative Zoology of Harvard College, vol. 14, no. 3, p. 74.

WALTON, B. C. 1954. The genus *Pylopagurus* (Crustacea: Anomura) in the Pacific with descriptions of two new species. Allan Hancock Pacific Expedition Reports, vol. 18, no. 2, pp. 138–173.

WASS, M. L. 1963. New species of hermit crabs (Decapoda, Paguridae) from the western Atlantic. Crustaceana, vol. 6, no. 2, pp. 133–157.